

# STEPHEN WALKER

MECHATRONICS ENGINEERING AT THE UNIVERSITY OF STELLENBOSCH



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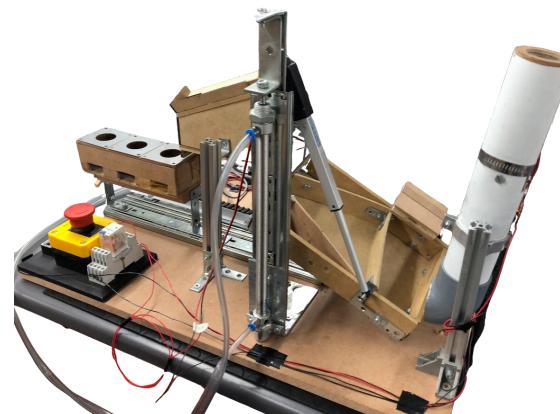
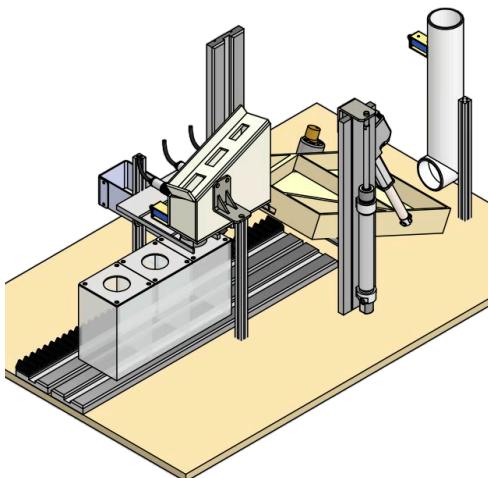


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## HIGH-SPEED COIN SORTER - STELLENBOSCH UNIVERSITY



### What?

- Design, program, and fabricate an automatic device that lifts, sorts & counts 3 different coin types with 90% accuracy <2 min
- CAD designs in Autodesk Inventor

### How?

- Implemented **feedback control** & RRL code in **Siemens TIA** Portal
- **InTouch** was used for the visualisations.

### Results

- The design fulfilled its purpose with 95% accuracy with a coin sorting speed of ~20 coins/minute earning my team a distinction for the project

## RED BULL BOX CART RACE



### What?

- Entered into the Red Bull Box Cart Race 2022 as 'The Potjie Boytjies'
- Designed and fabricated a box cart within required weight, break, and steering specifications from Red Bull

### How?

- **MIG welded** the chassis
- **FEA** was done to verify the structural integrity
- Hydraulic disc breaks were used for front and rear breaking
- Designed T-shirts and sold them to fund the project

### Results

- The box cart withstood all obstacles, leading my team to victory.

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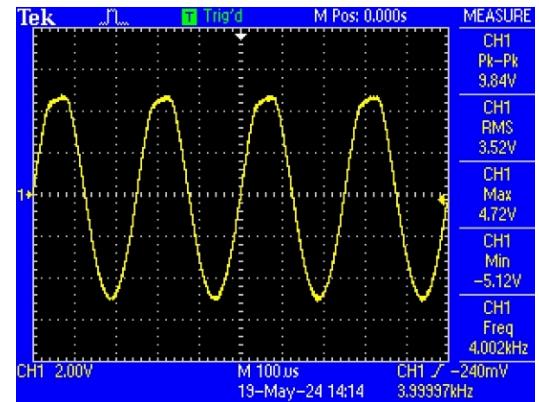
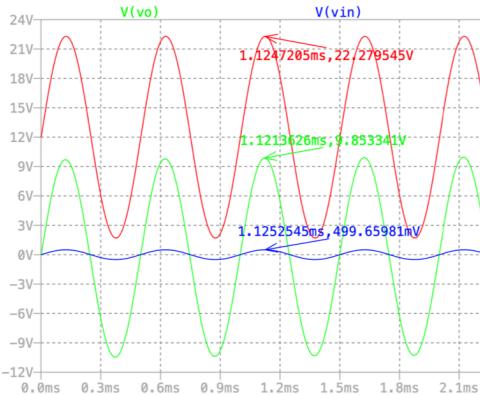
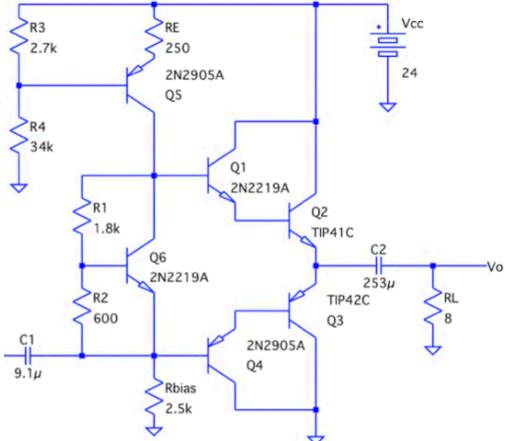


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## CLASS AB AUDIO AMPLIFIER - STELLENBOSCH UNIVERSITY



### What?

- Designed and fabricated a class AB power amplifier with volume control to deliver 5W of undistorted power to an 8 Ohm speaker

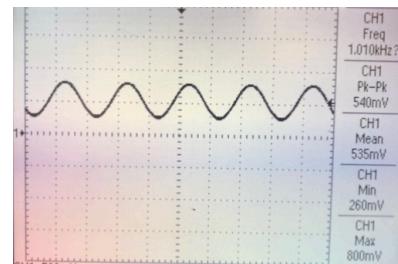
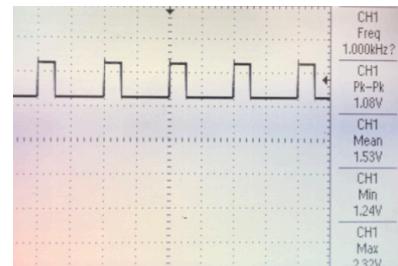
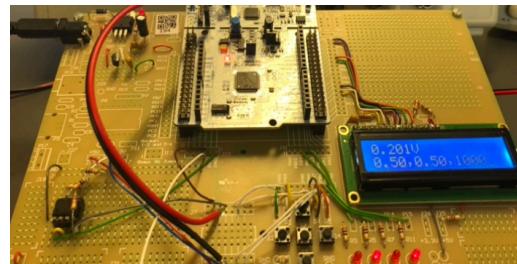
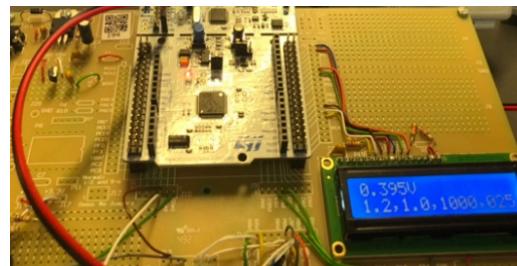
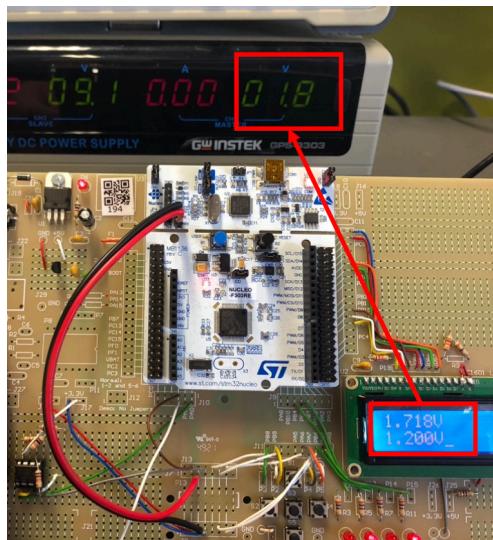
### How?

- Circuit analysis was done to calculate theoretical values for each element to ensure power ratings were not exceeded
- LTS spice** was used to simulate the theoretical design

### Results

- The design fulfilled its purpose by amplifying a 500mV audio signal to a 4.6V output signal with no crossover distortion as seen in the oscilloscope reading above for a sinusoidal input

## MULTIMETER & SIGNAL GENERATOR - STELLENBOSCH UNIVERSITY



### What?

- Designed, programmed, and fabricated a digital multimeter and signal generator that measures and outputs DC&AC signals within required specifications

### How?

- Programmed a **STMF303RE** microcontroller using the **STMCubeIDE** and used the **1602 LCD Module** to display measured results and to set the output using the 5 buttons
- This project required an in-depth understanding of **embedded systems**.

### Results

- The design successfully measured DC and AC values and was able to generate sinusoidal and PWM signals with 97% accuracy

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## BUSINESS EVALUATION - WALKER ENGINEERING CONSULTANTS LTD.

3/2/2023

2022 Business Evaluation  
Walker Engineering Consultants Limited

Stephen Walker: [s.walkereng@outlook.com]  
WALKER ENGINEERING CONSULTANTS LTD

# Clockify

# xero

# R Studio®

# Excel



### What?

- Conducted a business evaluation using **Clockify** and **Xero** data to identify client types associated with higher billable rates

### How?

- After inspecting, cleaning and transforming the data using R Studio, pivot tables were used in excel to visualise the data

### Results

- The data from Clockify correlated strongly with the Xero data and resulted in accurately determining the client types with the higher billable rates

## 5-YEAR SURVEY CATERPILLAR C18 670HP - M/Y APOSTROPHE

CATERPILLAR®

SEBU7899-02  
February 2008



## Operation and Maintenance Manual

### C18 Industrial Engine

WJH14-Up (Engine)



### What?

- Worked alongside the chief engineer on the 5 year survey of the twin diesel **Caterpillar C18 670hp** engines for motor yacht Apostrophe on dry dock

### How?

- Performed an engine overhaul, including engine hoisting, gasket replacement, and detailed engine cleaning
- Adhered to the operational and maintenance protocols outlined in the Caterpillar C18 diesel engine manual

### Results

- The successful completion of the five-year service allowed for M/Y Apostrophe to be relaunched in time for the yachting season, with no subsequent issues reported.